

Caffeine-containing Beverages and Premenstrual Syndrome in Young Women

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Abstract: I evaluated the hypothesis that consumption of caffeine-containing beverages causes premenstrual syndrome by studying 295 college sophomores. Data about premenstrual syndrome and beverage consumption were collected by a self-administered questionnaire. Analysis of the data revealed that consumption of caffeine-containing beverages is strongly related to the presence and severity of premenstrual syndrome and that the effects exist for most of the premenstrual symptoms studied. (*Am J Public Health* 1985; 75:1335-1337.)

Introduction

Premenstrual syndrome is an array of symptoms that occurs during the second half of the menstrual cycle. The symptoms typically include one or more of the following: depression, tiredness, irritability, anxiety, headache, breast swelling and tenderness, craving for sweet or salty foods, constipation, and skin acne.¹⁻³

Estimates of the prevalence of premenstrual syndrome among United States menstruating women, aged 18 years or older, range from about 60 to 95 per cent, with approximately 10 to 15 per cent of women experiencing severe or disabling symptoms.⁴⁻⁷

Causes of premenstrual syndrome remain unknown. Some investigators, notably Dalton,⁸ believe that a hormonal imbalance, particularly a deficit of progesterone, may be responsible. Other investigators suggest that a dietary deficiency may be involved.⁹⁻¹² Few conclusive data exist to support either hypothesis.

This study was undertaken to assess the relation between consumption of caffeine-containing beverages and premenstrual syndrome in young women. I theorized that because premenstrual syndrome is common among young menstruating women, the syndrome might be caused by a habit acquired during the second decade of life. In addition, several investigators have reported improvement in premenstrual breast tenderness following reduction in caffeine intake.¹³⁻¹⁵

Methods

The study was conducted at a private university in the Boston area. Eligible individuals were the 525 currently enrolled, female sophomores.

A questionnaire was placed in each sophomore's registration packet, together with a cover letter explaining the general nature of the study and requesting her participation. The questionnaire solicited information about the presence and severity of premenstrual syndrome (appendix A) and of menstrual symptoms, demographic characteristics, health-related characteristics, use of over-the-counter drugs containing caffeine, and consumption of caffeine-containing

beverages. The questions pertaining to caffeine-containing beverage use asked for the usual, daily consumption of coffee, tea and cola.

Three-hundred-and-five sophomore women (58 per cent) responded either to the questionnaire contained in the registration packet or to a second questionnaire sent through the mail. Ten respondents were not included in the analysis: two respondents were aged 30 years or older, four did not menstruate on a regular basis, and four did not provide information on the presence of premenstrual syndrome or on the consumption of caffeine-containing beverages. These exclusions left data on 295 women with an average age of 19 years (range = 18 to 21 years) for analysis.

I estimated the premenstrual syndrome prevalence odds ratio (the prevalence odds of premenstrual syndrome among women who consume caffeine-containing beverages divided by the prevalence odds for women who do not consume these beverages) for two levels of daily consumption of caffeine-containing beverages: one-half to four drinks, and four-and-one-half to 15 drinks. Caffeine intake from over-the-counter drugs was included in the estimates of daily consumption of caffeine-containing beverages, with the equivalence between the amount of over-the-counter drug and the drinks of a caffeine-containing beverage determined by the information provided on each drug's package.

The level of severity for premenstrual syndrome was determined by each participant in response to a question asking her to assess the overall severity of her symptoms.

Heterogeneity of the prevalence odds ratio according to the presence or absence of oral contraceptive use during the past three months or daily intake of vitamin supplements was evaluated using Miettinen's likelihood ratio test, as described by Rothman and Boice.¹⁷ Confidence limits for the prevalence odds ratios were based either on Miettinen's test-based procedure^{18, 19} or on Miettinen's modification of Fisher's exact limits,²⁰ using the programs of Rothman and Boice.

Results

Two-hundred-and-sixteen (73 per cent) of the respondents reported experiencing premenstrual syndrome, 128 (43 per cent) of whom felt that their symptoms were moderate or severe. The prevalence of premenstrual syndrome, and in particular of moderate or severe premenstrual symptoms, increased with greater consumption of caffeine-containing beverages (Table 1).

Table 2 shows the prevalence odds ratios by daily caffeine-containing beverage consumption and severity of premenstrual syndrome. For each category of severity, the prevalence odds ratio is higher for women who consume four-and-one-half to 15 caffeine-containing drinks per day than for women who drink fewer caffeine-containing beverages per day. In addition, the ratios are higher for women with moderate or severe premenstrual syndrome than for the category which includes women with mild symptoms.

The estimated prevalence odds ratios differed only slightly according to whether the women used oral contra-

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TABLE 1—Number of Respondents According to Daily Consumption of Caffeine-containing Beverages and Severity of Premenstrual Syndrome

Daily Consumption of Caffeine-containing Beverages (Number of Drinks)	Severity of Premenstrual Syndrome	Number of Respondents	(Per Cent of Respondents)
0	No Symptoms	11	(34)
	Mild	16	(50)
	Moderate or Severe	5	(16)
	Total	32	(100)
0.5 to 4 (median = 2.0)	No Symptoms	53	(30)
	Mild	54	(30)
	Moderate or Severe	72	(40)
	Total	179	(100)
4.5 to 15 (median = 5.8)	No Symptoms	15	(18)
	Mild	18	(21)
	Moderate or Severe	51	(61)
	Total	84	(100)

ceptives within the past three months or whether the women took daily vitamin supplements (data not shown).

All symptoms of premenstrual syndrome studied, with the possible exceptions of constipation and "other symptoms," were strongly associated with the consumption of caffeine-containing beverages (Table 3).

The distributions of type of caffeine-containing beverages consumed were similar for women who experienced no, mild, or moderate or severe premenstrual syndrome. Overall, 32 per cent of drinks were drinks of coffee, 19 per cent were drinks of tea, 49 per cent were drinks of cola and one per cent was caffeine taken in the form of an over-the-counter drug.

Discussion

Overreporting of consumption of caffeine-containing beverages by women who experience premenstrual syndrome is an unlikely explanation for the observed association between caffeine intake and premenstrual syndrome because there were no large, consistent differences by severity of premenstrual syndrome for any of the other health-related characteristics studied, including cigarette smoking

TABLE 3—Prevalence Odds Ratios by Severity of Premenstrual Syndrome According to Daily Consumption of Caffeine-containing Beverages and Symptoms

Symptom of Premenstrual Syndrome	Prevalence Odds Ratio of Mild, Moderate or Severe Symptoms		Prevalence Odds Ratio of Moderate or Severe Symptoms	
	0.5 to 4 Drinks	4.5 to 15 Drinks	0.5 to 4 Drinks	4.5 to 15 Drinks
Any Symptom	1.2	2.4	3.0	7.5
Depression	3.3	5.4	5.6	12.1
Tiredness	1.9	4.9	2.6	8.8
Irritability	1.4	2.9	2.5	6.2
Anxiety	2.9	5.0	3.7	7.2
Headache	1.2	3.4	1.5	5.1
Breast Swelling and Tenderness	1.6	3.3	4.0	9.3
Craving for Sweet Foods	1.1	2.9	3.0	8.7
Craving for Salty Foods	2.1	8.8	1.2	7.3
Constipation	0.3	1.3	0.3	1.5
Acne	1.1	1.9	2.5	6.0
Other Symptoms	0.7	2.3	0.9	2.7

habit, alcohol use, level of exercise, weight/height and level of depression, worry or anxiety.

Possible interpretations for the observed association between caffeine-containing beverages and premenstrual syndrome include the following:

- Consumption of large amounts of any liquid, and not only of caffeine-containing beverages, may be causally related to premenstrual syndrome.
- Women who consume large amounts of coffee, tea, and cola may differ from women who do not consume these beverages in ways that are causally related to premenstrual syndrome.
- Consumption of caffeine-containing beverages may cause premenstrual syndrome. A possible mechanism for such an effect involving the cyclic nucleotides is presented by Minton, *et al.*^{15, 16}

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TABLE 2—Prevalence Odds Ratios by Severity of Premenstrual Syndrome According to Daily Consumption of Caffeine-containing Beverages

Daily Consumption of Caffeine-containing Beverages (Number of Drinks)	Prevalence Odds Ratio of Mild, Moderate or Severe Symptoms (90% Confidence Interval)	Prevalence Odds Ratio of Moderate or Severe Symptoms (90% Confidence Interval)
0	1.0	1.0
0.5 to 4 (median = 2.0)	1.2 (0.6-2.4)	3.0 (1.2-8.1)
4.5 to 15 (median = 5.8)	2.4 (1.1-5.2)	7.5 (2.7-21.2)

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APPENDIX

Subset of the questionnaire: Questions concerning premenstrual syndrome.

7. Do you experience *premenstrual* syndrome? Yes _____ No _____
(Premenstrual syndrome is an array of symptoms beginning approximately one week *prior* to your menstrual period and generally ending a couple of days *prior* to your period. Premenstrual syndrome is different from menstrual symptoms, which occur at the time of your period. The most common symptoms are listed in Question 8.)
8. If you do experience *premenstrual* syndrome, which of the following symptoms do you usually experience? (If you do not experience premenstrual syndrome, skip to Question 13.)
 Depression _____
 Tiredness _____
 Irritability _____
 Anxiety _____
 Headaches _____
 Breast swelling and tenderness _____
 Craving for sweet foods _____
 Craving for salty foods _____
 Constipation _____
 Skin acne _____
 Other (please specify) _____
9. Would you say that your *premenstrual* symptoms (described in Question 8) overall are mild, moderate or severe? _____

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